

PATENT SPECIFICATION

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(19)



(54) IMPROVEMENTS IN THE TREATMENT OF SEEDS

(71) We, RANKS HOVIS McDUGALL LIMITED, of RHM Centre, 152 Grosvenor Road, London SW1V 3JL, a British company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in the following statement:—

This invention relates to improvements in the treatment of seeds and in particular to an improved helical conveyor for use in apparatus for the treatment of seeds.

In this Specification where reference is made to the word "seeds" it is intended that this should refer to seeds such as wheat, barley, oats or beans which are normally sown in vast numbers for the growing of crops. Such seeds are normally obtained from one harvest, are then treated for storage purposes and are utilised during a subsequent sowing season. It is, therefore, most desirable to treat the seeds as soon as possible after they have been harvested so as to prevent their deterioration during storage. It is also desirable in some cases to treat the seeds so that when they are subsequently sown in the ground, they are resistant to attack prior to and during germination.

Various devices have been proposed for treating seeds to coat them with substances which prevent deterioration during storage and when sown in the ground. Difficulties which the prior proposals have encountered are, for example, that the substances with which the seeds are to be coated have not been applied evenly. Also, the seeds have been damaged during the application of the protective substances. Still further, because frequently very large volumes of seeds are being treated, it is necessary for the throughput of the machines to be large; and it is the main object of this invention to provide a machine which has all of the above desirable qualities and a helical conveyor for use in such a machine.

In the Auslegeschrift 1120850 there is disclosed a helical agitator which functions as a mixer for powdered, granular and fibrous materials having a mixing chamber which is inclined to the horizontal so that the conveyor elevates the charge in the mixing chamber and then the charge falls downwardly through apertures in the flights. The angle of elevation of the chamber is chosen to be at least equal to the angle of repose of the particulate material being mixed.

Such apparatus will only operate on the batch principle and not continuously.

Auslegeschrift 1120850 discloses a helical agitator in which the leading edge of each flight is forwardly of the trailing edge of the next forward flight. Successive flights are disposed at intervals equal to one half the axial length of the flights which means that each flight has its leading edge at the same axial position as the trailing edge of the next but one more forward flight.

According to the present invention there is provided a helical conveyor for use in the treatment of seeds, comprising a central shaft having a plurality of similar flights fixed thereto, the leading (as herein defined) edge of each said flight (apart from the first two flights) being disposed axially forwardly (as herein defined) of the trailing (as herein defined) edge of the next but one forward flight.

In this Specification where reference is made to "leading" and "trailing" edges of flights, these are to be viewed in accordance with the intended direction of rotation of the helical conveyor. Also, where reference is made to the "forward" and "rearward" flights, this again is to be viewed in accordance with the intended direction of rotation of the conveyor in that the conveyor would convey material from the forward end to the rearward end thereof.

The invention also includes apparatus for the treatment of seeds, including a helical

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conveyor as above, mounted for rotation within a casing which wholly or partly surrounds the conveyor, inlet means at the forward (as herein defined) end of the casing for admitting seeds to be treated into the casing, exit means at the rearward (as herein defined) end of the casing for the discharge of treated seeds and means intermediate the inlet and exit for admitting a substance for treating the seeds.

In order to particularly describe the invention, one embodiment thereof will now be referred to, by way of example only, and with reference to the accompanying drawings, in which:—

FIGURE 1 is a diagrammatic side elevation of apparatus according to the invention;

FIGURE 2 is a detailed diagrammatic view of the helical conveyor in accordance with the invention; and

FIGURE 3 is a side view of the conveyor of Figure 2.

The apparatus of the invention includes a helical conveyor generally indicated at 1 which is located within a cylindrical casing 2 the conveyor being mounted in bearings 3 and being driven through a sprocket 4 from any suitable power source.

The means for rotating the conveyor 1 will incorporate a speed control device so that an accurate adjustment of the speed of rotation of the conveyor 1 may be achieved.

At the forward end 5 of the casing 2 there is provided inlet means 6 for the seeds and the inlet means is in the form of a rectangular, open-topped and bottomed box through which the seed is fed from a hopper (not shown) through a feed control device. The feed control device may be in the form of a sliding plate which may open or close the opening through which the seed may fall. Located in the sides of the inlet box are liquid nozzles 7, a plurality of these nozzles being arranged around one or more sides of the box 6 so as to spray liquid into the box 6 as seed is passing therethrough.

Leading from the box 6 may be one or more vacuum pipes (not shown) connected to a pump so as to extract dust or other small unwanted particles from the area of the box 6 and thus maintain the area of the conveyor 1 reasonably clear of dirt and dust.

Spaced slightly from the box 6 is a further inlet 8 through which powder may be passed to treat the seeds. This powder inlet may have associated powder feed control means (not shown) so that the requisite amount of powder is fed to the conveyor for coating the seeds. The inlet 8 may be adjustable in position along the length of the cylinder 2.

At the rearward end of the cylinder 2 and conveyor 1 is an outlet 9 and through the outlet 9 treated seeds may pass to be bagged

for storage purposes.

The construction of the conveyor 1 is important in the present invention and the manner of its construction is shown in Figures 2 and 3 of the drawings.

The conveyor 1 is made up of a central shaft 10 having a plurality of similarly shaped flights 11 welded or otherwise fixed thereto. The manner in which the flights are fixed to the shaft 10 is clearly illustrated in Figures 2 and 3, and, as will be appreciated by studying these drawings, the pattern of the flights repeats every five flights. Each flight subtends an angle of 144° when viewed axially of the conveyor. In the particular embodiment disclosed, the leading edge 12 of one flight is coaxial with the trailing edge 13 of the next forward flight and therefore every five flights, the flights will have rotated around the central shaft two complete revolutions. However, the leading and trailing edges of the flights may not be in line axially, as mentioned above, but it is important for the performance of the invention that adjacent flights overlap laterally.

It will also be noticed that the leading edge of each flight, say edge 12, (apart from the first three flights) lies between the next forward flight 14 and the next but two forward flight 15.

The effect of this particular construction of conveyor when the apparatus is in use and when seeds are fed to the inlet for treatment and at a rate in keeping with the speed of rotation of the conveyor such that the seeds just cover the top of the central shaft 10, is quite striking in that the seeds appear to float as they pass from the forward end to the rearward end of the conveyor. It is possible to notice a "waterfall" effect in that, in the particular construction illustrated in the drawings, the conveyor would be rotated in the direction of arrow 16 for the feeding of seed from the forward end 5 to the rearward end 17 of the conveyor, and the "waterfall" effect would be noticed in that the seeds would appear to fall from the side 18 to the side 19 of the central shaft 10.

There is also another effect which can be observed which might be called the "fin" effect, and this occurs because when each flight leaves the surface of the seeds on the side 18 of the central shaft 10, the flight appears to give a temporary backward motion to the progressive rearward motion of the seeds by what may be described as a "flip" of its tail, i.e. the trailing edge of the flight. This appears to have the effect of creating a void within the mass of seeds.

A still further effect has been noticed and this might be called the "porpoise" effect which is that as the flights enter and leave the mass of seeds on the side 18 of the central shaft 10, it appears that each flight

acts somewhat like a porpoise when swimming through water. This imparts to the seeds a kind of backwards and forwards motion.

- 5 It is believed that all of these effects mentioned above contribute in some way to the effective coating of the seeds with the liquid and/or the power fed into the casing, and it has been found that the coating is very
10 evenly disposed over the surface of the seeds. Furthermore, the seeds are undamaged because the treating motion is gentle. It could also be said that during use the mass of seeds appears to achieve a fluid consistency
15 in that they appear to flow very easily, one upon the other, and the effect of this is not only that they are effectively coated by the material fed into the apparatus, but also the power consumption of the prime mover
20 which drives the conveyor is very low.

The apparatus of the invention is suitable for treating any seeds with dressings or coverings, and in particular wheat would normally be dressed with organo-mercury
25 compounds or possibly with organo-phosphorus compounds. These are normally powders, although liquid forms do exist. In addition a Lindane based insecticide would be added. Barley and oats would be
30 dressed with similar components, but in addition systematic fungicides in slurry form may be added. Barley may be dressed with slurry in addition to the above mentioned powder, the base of which is ethirimol.
35 Beans may be dressed with fungicide containing Benomyl and Thiram, whilst maize may be dressed with a bird repellent slurry. Cols may also be fed to the machine for coating the seeds.

40 The speed of rotation of the conveyor, the rate at which the seeds are fed to the apparatus, the rate at which liquid or powder or col or slurry is fed to the apparatus, and the level of the seeds in passing along the conveyor, are all dependent upon the type
45 of seeds being treated and the material with which they are being treated. Usually, however, the conveyor will be rotated at a speed between 80 and 100 revolutions per
50 minute.

WHAT WE CLAIM IS:—

1. A helical conveyor for use in the treatment of seeds, comprising a central shaft

having a plurality of similar flights fixed thereto, the leading (as herein defined) edge 55 of each said flight (apart from the first two flights) being disposed axially forwardly (as herein defined) of the trailing (as herein defined) edge of the next but one forward flight. 60

2. A helical conveyor as claimed in Claim 1, in which the leading edge of each said flight (apart from the first three flights) lies axially between the next forward flight and the next but two forward flight. 65

3. A helical conveyor as claimed in either Claim 1 or Claim 2, in which the leading edge of each said flight is axially in line with the trailing edge of the next forward flight. 70

4. A helical conveyor as claimed in any one of the preceding claims, in which each flight subtends an angle of 144° when viewed axially of the conveyor.

5. Apparatus for the treatment of seeds, 75 including a helical conveyor as claimed in any one of the preceding claims mounted for rotation within a casing which wholly or partly surrounds the conveyor, inlet means at the forward (as herein defined) 80 end of the casing for admitting seeds to be treated into the casing, exit means at the rearward (as herein defined) end of the casing for the discharge of treated seeds and means intermediate the inlet and exit for ad- 85 mitting a substance for treating the seeds.

6. Apparatus as claimed in Claim 5, in which the inlet means comprises one or more openings through which powder may be admitted and/or a plurality of nozzles through 90 which liquid may be sprayed to within the casing.

7. A helical conveyor for the treatment of seeds substantially as herein described with reference to Figures 2 and 3 of the accom- 95 panying drawings.

8. Apparatus for the treatment of seeds substantially as herein described with reference to Figs. 1, 2 and 3 of the accom- 100 panying drawings.

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Fig. 1

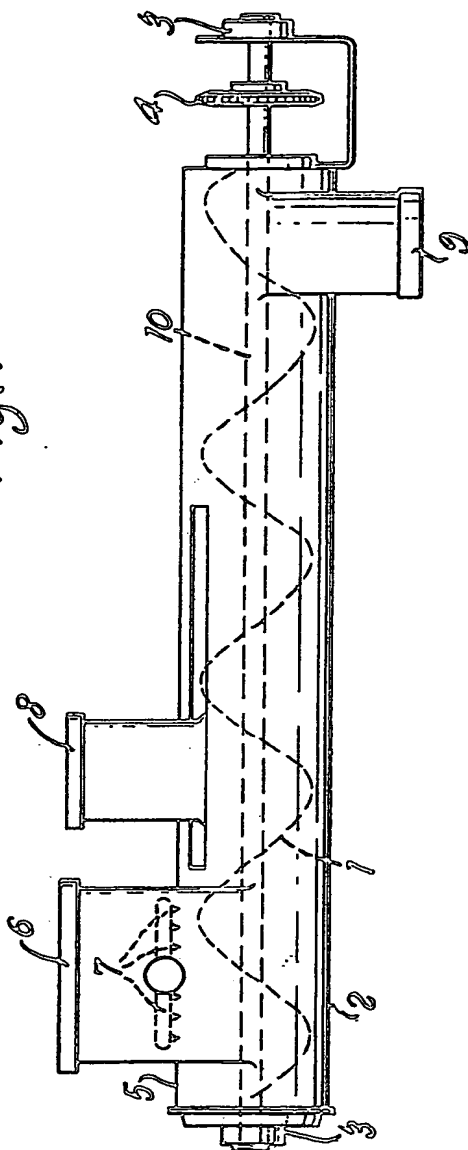
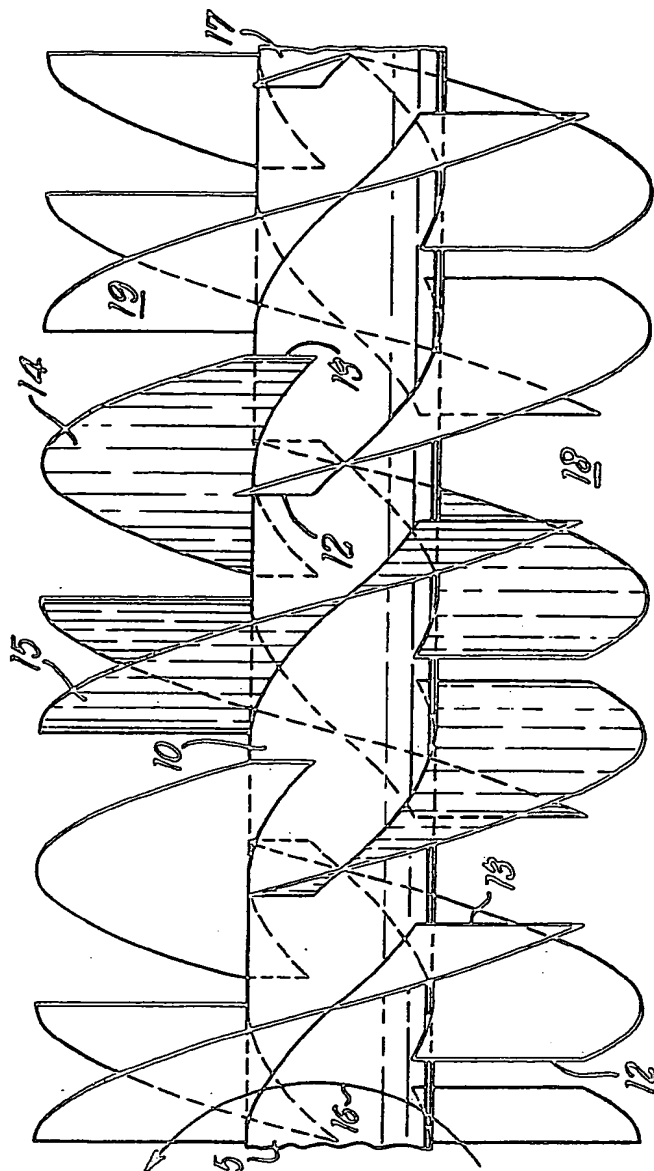


Fig. 2



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3 SHEETS

COMPLETE SPECIFICATION
*This drawing is a reproduction of
the Original on a reduced scale*

Sheet 3

Fig. 3

